What is claimed is:

1. An apparatus for modifying a top conductive surface of a multi-layer workpiece in the presence of a solution, the apparatus comprising:

an electrochemical mechanical processing system adapted to process the top conductive layer of the workpiece in the presence of an applied potential and the solution and thereby establish planarity to the top conductive layer, the electrochemical mechanical processing system including a workpiece surface influencing device disposed in proximity to the workpiece during electrochemical mechanical processing; and

a sensor adapted to provide a signal that contains information indicative of the planarity of the top conductive layer at various points in time during processing of the top conductive layer by the electrochemical mechanical processing system.

2. The apparatus according to claim 1 wherein the electrochemical mechanical processing system provides for electrochemical mechanical deposition that plates a conductor from the solution onto the top conductive surface of the workpiece, and wherein the sensor includes a light source and an optical sensor adapted to detect a reflected light beam obtained from a light beam from the light source that has been reflected from the top conductive surface of the workpiece during deposition of the conductor.

3. The apparatus according to claim 2 wherein the reflected light beam is used to indicate a surface roughness of the workpiece, the planarization of the top conductive

layer causing a greater amount of the reflected light beam to be sensed by the optical sensor than prior to the planarization of the top conductive layer.

4. The apparatus according to claim 3 wherein the sensor senses the surface roughness of the workpiece prior to deposition of the conductor, which surface roughness exists due to features disposed below the top conductive surface, and wherein the sensor senses planarity of the top conductive surface of the workpiece when top surface features corresponding to the features disposed below from the top conductive surface are reduced due to the conductor being deposited within the top surface features.

5. The apparatus according to claim 4 wherein the signals provided by the sensor, when the top conductive surface of the workpiece is planarized, are input to a processor that operates upon the signals to provide a planarization signal.

6. The apparatus according to claim 5 wherein the processor provides the planarization signal to the electrochemical mechanical processing system when planarization of the top conductive layer is achieved,

7. The apparatus according to claim 6, wherein the electrochemical mechanical processing system, upon receipt of the planarization signal, performs another electrochemical mechanical process different from electrochemical mechanical deposition.

8. The apparatus according to claim 1 wherein the sensor includes an optical system comprising at least one light source and at least one light sensor, the optical system adapted to transmit an input beam of light from the at least one light source onto the top conductive surface of the workpiece and to detect a reflected beam of light with the light sensor and generate the signal.

9. The apparatus according to claim 8 wherein the light source emits a beam of light having a wavelength determined based upon a material that forms the top conductive surface.

10. The apparatus according to claim 8 wherein the light sensor detects the reflected beam of light with an increased intensity when a substantial planarity of the top conductive surface of the workpiece is achieved.

11. The apparatus according to claim 10 wherein the electrochemical mechanical processing system provides for electrochemical mechanical deposition that deposits a conductor onto the top conductive surface, and wherein the substantial planarity of the surface of the workpiece occurring as a result of the conductor filling patterns within the top conductive surface of the workpiece.

12. The apparatus according to claim 11 wherein the light sensor detects that the intensity of the reflected beam of light changes as the planarity of the surface of the workpiece changes.

13. The apparatus according to claim 11 wherein the optical detector detects that the intensity of the reflected beam of light increases as the planarity of the surface of the workpiece increases.

14. The apparatus according to claim 11 wherein the optical system further includes a processing circuit that generates a planarization signal from a plurality of the signals when the top conductive surface of the workpiece is planarized.

15. The apparatus according to claim 14 wherein the processing circuit is a computer.

16. The apparatus according to claim 8 wherein the reflected light beam is used to indicate a surface roughness of the workpiece, and planarization of the top conductive layer causing a greater amount of the reflected light beam to be sensed by the optical sensor than a non-planarized top conductive layer.

17. The apparatus according to claim 16 wherein the sensor senses the surface roughness of the workpiece initially upon operation upon the conductive top surface layer by the electrochemical mechanical processing system and the sensor senses planarity of the top conductive surface by providing the signals with the information indicative of the planarity of the top conductive layer being an intensity value that exceeds a predetermined threshold.

18. The apparatus according to claim 17 wherein the signals provided by the sensor, when the top conductive surface of the workpiece is planarized, are input to a processor that operates upon the signals to provide a planarization signal.

19. The apparatus according to claim 18 wherein the processor provides the planarization signal to the electrochemical mechanical processing system when planarization of the top conductive layer is achieved,

20. The apparatus according to claim 16 wherein the electrochemical mechanical processing system provides for electrochemical mechanical etching that removes a conductor from the top conductive surface of the workpiece.

21. The apparatus according to claim 20 wherein the sensor senses the surface roughness of the workpiece initially upon performing electrochemical mechanical etching of the conductive top surface layer by the electrochemical mechanical processing system and the sensor senses planarity of the top conductive surface by providing the signals with the information indicative of the planarity of the top conductive layer being an intensity value that exceeds a predetermined threshold.

22. The apparatus according to claim 21 wherein the signals provided by the sensor, when the top conductive surface of the workpiece is planarized, are input to a processor that operates upon the signals to provide a planarization signal.

23. The apparatus according to claim 22 wherein the processor provides the planarization signal to the electrochemical mechanical processing system when planarization of the top conductive layer is achieved,

24. The apparatus according to claim 16 wherein the workpiece includes a barrier layer disposed below the top conductive layer, and the optical detector detects that the intensity of the output beam of light abruptly changes when the barrier layer is exposed.

25. An apparatus for operating upon a multi-layer workpiece using a solution, the apparatus comprising:

electrochemical mechanical processing equipment adapted to operate on a top layer of the workpiece in the presence of an applied potential and the solution using a workpiece surface influencing device, the top layer of the workpiece being formed of a material; and

an optical system comprising at least one light source and at least one light sensor, the optical system adapted to transmit a beam of light from the at least one light source onto the top layer of the workpiece and to detect a reflected beam of light with the light sensor, the reflected beam of light providing at different points in time a signal with a reflectivity characteristic indicative of an amount of planarity of the top layer of the workpiece.

26. The apparatus according to claim 25 wherein the optical system further includes a processor adapted to provide a planarization signal to the electrochemical

mechanical processing equipment based upon the signal obtained at different points in time, the planarization signal indicating that the top layer of the workpiece is substantially planar.

27. The apparatus according to claim 26 wherein, upon receipt of the planarization signal, the electrochemical mechanical processing equipment is operated to perform a different operation.

28. The apparatus according to claim 27 wherein the electrochemical mechanical processing system provides electrochemical mechanical deposition that plates a conductor from the solution onto the top layer of the workpiece and wherein the top layer is an insulator.

29. The apparatus according to claim 28 wherein the optical reflection from the top layer of the workpiece is indicative of a surface roughness of the top layer, the sensor further adapted to provide the indication to the electrochemical mechanical processing system when planarization of the top layer is achieved, the planarization of the top layer causing a greater amount of reflected light to be sensed by the optical sensor than prior to the planarization of the top layer.

30. The apparatus according to claim 29 wherein the sensor senses the surface roughness of the workpiece prior to deposition of the conductor, which surface roughness exists due to features within the top layer, and wherein the sensor senses

planarity of the top layer of the workpiece when the features are reduced due to the conductor being deposited within the features.

31. The apparatus according to claim 30 wherein the signals provided by the sensor, when the top surface of the workpiece is planarized, are input to a processor that operates upon the signals to provide a planarization signal.

32. The apparatus according to claim 31 wherein the processor provides the planarization signal to the electrochemical mechanical processing system when planarization of the top layer is achieved,

33. The apparatus according to claim 25 wherein the reflected beam of light has an intensity corresponding to the reflectivity characteristic.

34. A method for detecting planarization of a top surface of a multilayer workpiece in an electrochemical mechanical deposition process that uses a solution containing a conductor therein and operates upon the multilayer workpiece comprising the steps of:

depositing the conductor to fill features within the top surface of the workpiece in the presence of workpiece surface influencing device, an applied potential and the solution using electrochemical mechanical deposition; and

while depositing the conductor;

transmitting a beam of light onto the top surface of the workpiece to obtain a reflected beam of light, a characteristic of the reflected beam of light

being altered by a top surface pattern that exists due to the features within the top surface of the workpiece; and

detecting a change in the characteristic of the reflected beam of light indicative of a change in the top surface pattern of the workpiece.

35. The method according to claim 34 wherein the step of detecting a change further includes the step of providing an indicator to halt the step of depositing when the top surface pattern of the workpiece becomes planar, thus indicating the filling of the features with the conductor.

36. The method according to claim 35 further including the step of providing for a material removal step after receipt of the indicator.

37. The method according to claim 35 wherein the material removal step performs chemical mechanical processing.

38. The method according to claim 35 wherein the material removal step performs electrochemical mechanical etching within a same processing area as the step of depositing, and while performing electrochemical mechanical etching;

transmitting another beam of light onto the top surface of the workpiece to obtain another reflected beam of light; and

detecting another change in a characteristic of the another reflected beam of light indicative of a new material forming a new top surface of the workpiece.

39. The method according to claim 34 wherein the step of depositing deposits the conductor into features disposed in one of a top conductive surface of the workpiece and a top insulating surface of the workpiece.

40. The method according to claim 34 wherein the characteristic is intensity of the reflected beam of light.

41. The method according to claim 34 wherein the beam of light transmitted onto the top surface of the workpiece passes through the workpiece surface influencing device.

42. The method according to claim 41 wherein the characteristic is intensity of the reflected beam of light.

43. The method according to claim 34 wherein the beam of light transmitted onto the top surface of the workpiece is adjacent to the workpiece surface influencing device.

44. The method according to claim 43 wherein the characteristic is intensity of the reflected beam of light.

45. A method for detecting planarization of a top surface of a multilayer workpiece in an electrochemical mechanical deposition process that uses a solution

containing a conductor therein and operates upon the multilayer workpiece comprising the steps of:

operating upon a top surface of the workpiece in the presence of workpiece surface influencing device, an applied potential and the solution using electrochemical mechanical processing; and

while operating upon the top surface of the workpiece:

transmitting a beam of light onto the top surface of the workpiece to obtain a reflected beam of light, a characteristic of the reflected beam of light being altered by a top surface pattern that exists due to the features within the top surface of the workpiece; and

detecting a change in a characteristic of the reflected beam of light indicative of a change in the top surface pattern of the workpiece.

46. The method according to claim 44 wherein the step of detecting a change further includes the step of providing an indicator to halt the step of operating when the top surface pattern of the workpiece becomes planar.

47. The method according to claim 46 further including the step of providing for a material removal step after receipt of the indicator.

48. The method according to claim 47 wherein the material removal step performs chemical mechanical processing.

49. The method according to claim 47 wherein the material removal step performs electrochemical mechanical etching within a same processing area as the step of operating, and while performing electrochemical mechanical etching;

transmitting another beam of light onto the top surface of the workpiece to obtain another reflected beam of light; and

detecting another change in a characteristic of the another reflected beam of light indicative of a new material forming a new top surface of the workpiece.

50. The method according to claim 45 wherein the top surface is a top conductive surface of the workpiece and the step of operating deposits a conductor into features disposed in the top conductive surface of the workpiece.

51. The method according to claim 45 wherein the top surface is a top insulator surface of the workpiece and the step of operating deposits a conductor into features disposed in the top insulating surface of the workpiece.

52. A method for detecting planarization of a top surface of a workpiece in a deposition process that applies a conductor to a non-planar top surface of the workpiece comprising the steps of:

depositing the conductor to fill features within the non-planar top surface of the workpiece, thereby causing the non-planar top surface to become more planar over time; and

while depositing the conductor, obtaining a signal that contains information indicative of the planarity of the top conductive layer at various points in time, thereby detecting the non-planar top surface becoming more planar over time.

53. The method according to claim 52 wherein the step of obtaining comprises:

transmitting a beam of light onto the top surface of the workpiece to obtain a reflected beam of light, a characteristic of the reflected beam of light being altered by a top surface pattern that exists due to the features within the top surface of the workpiece; and

detecting the characteristic of the reflected beam of light indicative of a change in the top surface pattern of the workpiece and transforming that characteristic into the information in the signal, such that a change in the detected characteristic at various points in time indicates the non-planar top surface becoming more planar over time .

54. The method according to claim 53 wherein the step of detecting further includes the step of providing an indicator to halt the step of depositing when the top surface pattern of the workpiece becomes planar, thus indicating the filling of the features with the conductor.

55. The method according to claim 54 further including the step of providing for a material removal step after receipt of the indicator.

56. The method according to claim 54 wherein the material removal step performs chemical mechanical processing.

57. The method according to claim 54 wherein while performing the material removal step:

transmitting another beam of light onto the top surface of the workpiece to obtain another reflected beam of light; and

detecting another change in a characteristic of the another reflected beam of light indicative of a new material forming a new top surface of the workpiece.

58. The method according to claim 53 wherein the characteristic is intensity of the reflected beam of light.

59. The method according to claim 52 wherein the step of depositing deposits the conductor into features disposed in a top conductive surface of the workpiece.

60. The method according to claim 52 wherein the step of depositing deposits the conductor into features disposed in a top insulating surface of the workpiece.